

## **PELM 3400 Prime Movers and Auxiliaries**

*4 credits*

This course covers prime movers, air compressors, refrigeration, and lubrication as identified in the Alberta Boilers Safety Association Reference Syllabus for the second paper of 3rd Class Part B Power Engineering.

**Prerequisites:** Completion of 3<sup>rd</sup> class Part A theory or 3A ABSA

**Recommended Prerequisites:** It is strongly recommended that students have Math 20/3 or Math 20 Applied, Physics 20 or Science 20 and English 20 (Grade 11).

### **Instructor(s)**

John Cook (Chairperson)  
780-791-4904  
[John.cook@keyano.ca](mailto:John.cook@keyano.ca)  
Office#: BL151

Chula Perera  
780-792-5067  
[Chula.Perera@keyano.ca](mailto:Chula.Perera@keyano.ca)  
Office#: BL155

Eric Wheeler  
780-791-4895  
[Eric.wheeler@keyano.ca](mailto:Eric.wheeler@keyano.ca)  
Office: BL159

Dave McCormick  
780-791-5068  
[David.McCormick@keyano.ca](mailto:David.McCormick@keyano.ca)  
Office#: BL158

Nuwan De Alwis  
780-792-5728  
[Nuwan.DeAlwis@keyano.ca](mailto:Nuwan.DeAlwis@keyano.ca)  
Office#: BL157

Lawrence Brooks  
780-792-5066  
[Lawrence.Brooks@keyano.ca](mailto:Lawrence.Brooks@keyano.ca)  
Office#: BL153

### **Tutoring hours**

Tuesday & Thursday 6:30 – 9:30 pm

Instructors are available outside of the above hours.

Please contact the Power Engineering office at 780 791-4955 for an appointment.

### **Supervised Exams**

Please contact the Power Engineering office to schedule your supervised exam – 780 791-4955

**Required Resources:** (Available at Keyano College Bookstore)

Power Engineering Third Class (Textbook), Part B2 PanGlobal, Edition 2.0, ISBN 978-1-926900-01-8

2007 ASME Boiler & Pressure Vessel Code, An International Guide, Academic Abstract American Society of Mechanical Engineering, 2007 Edition, ISBN 978-1-897461-24-2

**Recommended Resource:** (Available at Keyano College Bookstore)

Power Engineering Third Class (Workbook), Part B2 PanGlobal, Edition 2.0

**Course Outcomes**

Upon successful completion of this course, students will be able to:

- Describe and differentiate between the principles, design, auxiliaries and operations of steam and gas turbines including steam turbine condenser systems, internal combustion engines, fired heaters, heat exchangers & cooling towers.
- Explain the operation of cogeneration systems including simple-cycle, combined-cycle, heat recovery generators and start-up procedures of cogeneration & simple-cycle plants.
- Describe the types of compressors in industrial plants including the application of theory, design, auxiliaries and operations.
- Analyze refrigeration & air conditioning systems showing their principles, auxiliaries and operations.
- Apply legislation to evaluate, and recommend corrective actions for, wastewater treatment plants including operations, filtering and separation.
- Describe plant maintenance & administration including record keeping, project management, operation procedures, communication and monitoring requirements.

## Evaluation

Students will be graded using percentage scales.

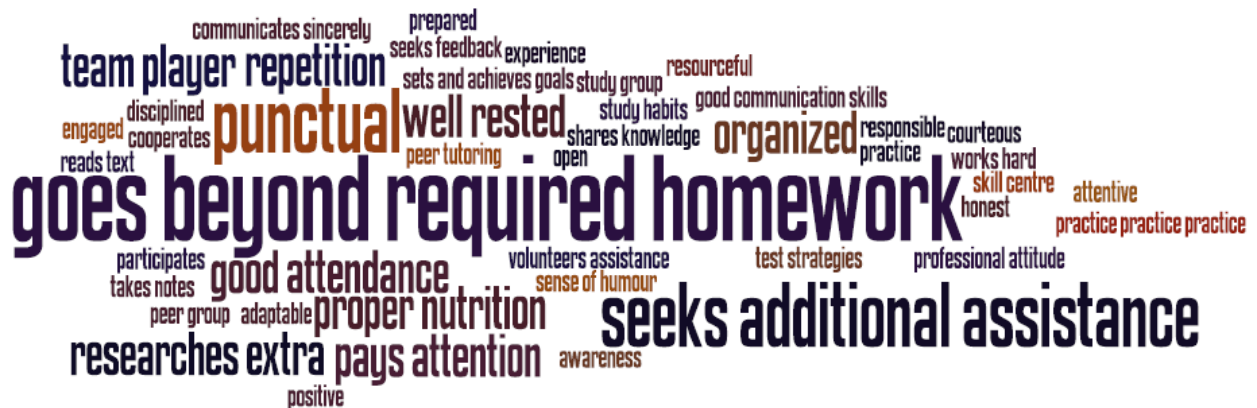
Category	Weight
Section “S” Test	10%
Section “S” Test	10%
“E” Exams (Supervised)	70%
Moodle Chapter & Unit Quizzes	10%
Total Grade	100%

*The minimum standard for passing all “S” & “E” exams and the overall course is a grade of 65%.*

## Performance Requirements

The Power Engineering online program provides access to a comprehensive computer question bank designed to highlight subjects in the Alberta Boiler’s Branch syllabi. Assessments are generated and marked by the Computer and Power Engineering Instructors. The online program is supplemented by tutorial assistance offered by qualified instructors during posted hours.

## Behaviours of a Successful Student



**SKILL Centre Information:**

The SKILL Centre is a learning space in the Clearwater Campus where students can gather to share ideas, collaborate on projects and get new perspectives on learning from tutorial staff. A student conference room is available for students to “reserve” for study group purposes. The SKILL Centre is for “support” not to “teach” you course content due to lack of attendance.

	<b>Monday - Friday</b>
<b>Monday to Friday</b>	<b>8:30 – 4:30</b>

**Additional evening & weekend tutorial hours will be posted in the Skill Centre or please contact [skill@keyano.ca](mailto:skill@keyano.ca) to confirm tutoring availability.**

**Academic Regulations**

Refer to page 26-40 of the Keyano College 2013-2014 Credit Calendar or use this link to view Keyano College’s [Academic Regulations](#):

**Keyano College Student Rights and Responsibilities:**

It is the student’s responsibility to read the Student Rights and Responsibility Policy document found in the Keyano College Credit Calendar 2013-2014, pages 36-40. The information contained in this policy should guide the student’s conduct while attending Keyano College. Below are a few “Highlights” to note:

**Student Rights:** The student has the right to:

- reasonable freedom of opinion and expression in the classroom, in assignments, and in exams, where course content allows.
- confidentiality of his/her personal records.
- proper and impartial evaluation of his/her performance and the right to request a re-evaluation within time lines and procedures established by the College.
- freedom from being subjected to physical, verbal, mental, or sexual harassment including any indignity, injury, violence or unfair accusation.

**Student Responsibilities:** The student has the responsibility to:

- respect the rights of ALL others. Respect is earned.
- refrain from threatening to subject or subjecting any person to physical, verbal, mental, or sexual harassment including any indignity, injury, violence or unfair accusations.
- respect the faculty member's right to determine course methodology, evaluation, right to set deadlines for assigned work, and to establish penalties for failure to comply with deadlines.
- refrain from unduly disturbing, disrupting or otherwise interfering with studies, laboratories, lectures, work or other activities of fellow students or staff.
- know the consequences of plagiarism, fraud, deceit, and/or other forms of academic and non-academic dishonesty.
- not openly share marks and other confidential information/material in the classroom.

## Teaching & Learning Methodologies

The Power Engineering online program through iLearn (Moodle); <http://ilearn.keyano.ca> is a system that provides students with a quick assessment of their academic achievement while they progress at their own pace, on their own schedule. Students can enroll at any time and have one year from the date of registration to complete both Part A and B theory. A total of two three-month extensions may be purchased. Extended hours and the ability for students to access the system from home or work are features designed to make the training as accessible as possible. **Please note:**

- iLearn/Moodle will be used for ongoing assessment purposes. Please be patient and forward questions/concerns regarding the test bank to the Power Engineering Department.
- All quizzes and exams on iLearn will open in a SECURE window. **Any attempts to breach security measures** (i.e. copy, print, screen capture, right clicking, navigation away from quiz/exam window, etc.) will automatically “kick” you out of the quiz. Occurrences of this nature **will be documented and kept on student record, be considered academic misconduct and just cause for disqualification of course completion.**

## Specialized Supports & Duty to Accommodate

### **Disability Support Services: Learner Assistance Program (LAP):**

If you have a documented disability or you think that you would benefit from some assistance from a Disabilities Counsellor, please call or visit the Disability Supports Office 780-792-5608 to book an appointment (across from the library). Services and accommodations are intended to assist you in your program of study, while maintaining the academic standards of Keyano College. We can be of assistance to you in disclosing your disability to your instructor, providing accommodations, and supporting your overall success at Keyano College.

### **Specialized Supports and Duty to Accommodate:**

Specialized Support and Duty to Accommodate are aligned with the office of Disability Support Services: Learner Assistance Program (LAP) guided by federal and provincial human rights legislation, and defined by a number of Keyano College policies. Keyano College is obligated by legislation to provide disability-related accommodations to students with identified disabilities to the point of undue hardship.

**Please Note:** It is your responsibility to contact the Office of the Registrar to **update your contact information** and complete forms related to changes of registration.

Keyano College

### **Office of the Registrar**

8115 Franklin Avenue

Fort McMurray, AB

T9H 2H7

Tel: (780) 791-4801

Fax: (780) 791-4952

Keyano College Main Switchboard Toll Free: 1-800-251-1408

Email: [registrar@keyano.ca](mailto:registrar@keyano.ca)

[www.keyano.ca](http://www.keyano.ca)

**Learning Outcomes**

1. Describe the support auxiliaries for a gas turbine and explain common operational, control and maintenance procedures.
2. Describe auxiliary support and control systems for steam turbines and explain start-up and shutdown procedures.
3. Explain typical designs, components and operating principles of steam turbine condensers.
4. Explain common designs, major components, operating principles, and arrangements for industrial gas turbines.
5. Explain the operating principles, designs, support systems, and operation of industrial internal combustion engines (ICE).
6. Explain cogeneration and describe common configurations, components and applications.
7. Explain the classification, designs, and operating principles of industrial air and gas compressors
8. Explain the control and system auxiliaries for a typical instrument air system and explain startup procedures for air compressors.
9. Explain the classification and properties of refrigerants and describe the operating principles and components of compression and absorption systems
10. Explain control and safety devices on a compression refrigeration system and explain procedures and equipment to control oil, non-condensables, moisture, refrigerant, and brine.
11. Describe the design, operation, and applications of various types of industrial heat exchangers.
12. Describe the design, components, operation, and applications of direct-fired and indirect-fired natural draft process heaters.
13. Explain start-up and shutdown procedures for an indirect-fired heater.
14. Explain typical components of maintenance and administration programs for utilities and process facilities.
15. Describe designs, operating principles and major components of steam turbines.